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FOUR NEW GENERA OF MICROVELIINAE (HETEROPTERA) FROM NEW GUINEA

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Four new genera of Microveliinae are described from New Guinea. These genera and their constituent species are as follows: *Tanyvelia* gen. n. containing type species *T. missim* sp. n. from Papua New Guinea; *Aegilipsicola* gen. n. containing type species *A. rapida* sp. n. from Papua New Guinea; *Tarsovelia* gen. n. containing type species *T. alta* sp. n. from Papua New Guinea, plus *T. arfak* sp. n. from Irian Jaya, and *T. dani* sp. n. from Irian Jaya; and *Neusterinsifer* gen. n. containing type species *N. compacta* sp. n. from Papua New Guinea, plus *N. sepik* sp. n. from Papua New Guinea, *N. cyclops* sp. n. from Papua New Guinea, *N. nabire* sp. n. from Irian Jaya, and *N. gladius* sp. n. from Irian Jaya. Habitus figures of the above new genera are provided, accompanied by illustrations of the male genital structures and distribution maps for all new species.

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Key words. – Veliidae; Microveliinae; New Guinea; taxonomy; new genera; new species; keys; distribution.

The assemblages of Microveliinae occurring on the islands of the Malay Archipelago exhibit a profound shift in taxonomic composition as one progresses from west to east through the region. On the Greater Sunda Islands, Celebes and the Philippines such faunas are dominated by members of the genera *Pseudovelia* Hoberlandt and *Microvelia* Westwood, accompanied by several other more ecologically specialized and less speciose genera. On New Guinea and surrounding islands, by contrast, *Pseudovelia* is absent and there occurs instead a group of previously undescribed endemic genera which fill the typical *Pseudovelia* niches. In addition, New Guinea also supports numerous endemic species of in the genus *Microvelia* sensu lato, but as noted by Andersen (1982) this generic grouping is almost certainly polyphyletic. A detailed analysis on a world basis of the subgroups contained within it will be necessary before it can be certain that the Papuan and Australian species presently held in *Microvelia* are in fact congeneric with the Asian forms.

New Guinea thus represents a major center of diversification for the Microveliinae, with a fauna derived independently from that occurring in the Asian tropics. In the present report we describe four new genera of endemic Papuan Microveliinae, all of which are easily separable from *Microvelia* sensu lato on the basis of distinct apomorphies. The relationships among these genera are still unresolved, however, pending the completion of ongoing revisions of the diverse Australian and New Guinea *Microvelia* faunas.

Key to genera of New Guinea Microveliinae

1. Middle tarsi subequal in length to middle tibia (fig. 9); light markings on hemelytra restricted to basal angles; fore femur of male at least slightly modified for phoresy .... *Tarsovelia* gen. n.
– Middle tarsi distinctly shorter than middle tibia (figs. 1, 5, 17); light markings on hemelytra may be restricted to basal angles, or may occur also on distal portions; fore femur may or may not be modified for phoresy (figs. 3, 6, 24-26) 2
2. Claws extremely long; light hemelytral markings entirely bright greyish to light bluish pruinose; gula long, rostral cavity demarcated by strongly raised carina .... *Aegilipsicola* gen. n.
– Claws relatively short; light hemelytral markings not bright pruinose; gula short, rostral cavity not demarcated by strongly raised carina 3
3. Antennae extremely long (fig. 1); comb on fore tibia 3/4 the length of the tibia (fig. 3); only micropterous morph known .... *Tanyvelia* gen. n.
– Antennae not extremely long (fig. 17); comb on fore tibia less than 3/4 length of tibia (except in *Neuterinsifer compacta*), if comb on fore tibia 3/4 length of tibia then male proctiger bearing elongate process and female abdominal tergites VII

and VIII forming an anal plate (see below); only apterous and macropterous morphs known, latter with large hemelytral light markings basally, and often occurring in all closed cells 4

4. Female abdominal tergites VII-VIII deflected ventrad forming an anal plate (fig. 23); male genitalia highly modified, bearing a long sinuate anteriorly directed sword-like process (figs. 18-22) .... *Neusterinsifer* gen. n.
- Female abdominal tergites VII-VIII not deflected ventrad, not forming an anal plate; male genitalia may be modified, but without a long sword-like process .... *Microvelia* Westwood

Tanyvelia gen. n.

(figs. 1-4, 27)

Diagnosis

Size. – Micropterous form, length of males 2.73-2.91 mm, females 2.81-3.13 mm; general body characteristics and size sexually dimorphic, males smaller, female abdomen more robust.

Colour. – Ground colour blackish brown, tinged with orange brown, without silvery pubescence; anterior pronotal lobe yellowish, pruinose, sharply demarcated from dark collar and posterior lobe. Micropterous wing pads brown, set with anterolateral light streaks.

Structural characters. – Only micropterous form known, shape elongate (fig. 1). Eyes globose, exserted but usually not beyond anterolateral pronotal angles, separated by about twice the width of an eye, appressed to anterior pronotal margin, with short ocular setae. Head declivant anteriorly, recessed into pronotum, posterior margin sloping caudo-dorsally, with usual three pairs of facial trichobothria; gular region moderately long, plainly visible, rostral cavity closed posteriorly. Rostrum reaching to middle of mesosternum, segment I short, enclosed in rostral cavity, segments I and IV subequal in length and about three times longer than II, segment III about 8 times as long as II. Antennae slender, very long, about 3/4 of body length.

Pronotum slightly raised medially, with weak median longitudinal carina; collar weakly formed, set off by a ragged row of small dark foveae, terminating under eyes laterally; anterior and posterior lobes set off by a transverse row of small foveae, evanescent medially; anterior lobe with scattered stiff erect dark setae; posterior lobe with numerous small foveae, humeri not prominent, broadly rounded posteriorly, not modified, covering metanotum. Thoracic venter not diagnostic, with weakly formed tubercles on either side of mesosternal midline on posterior margin opposing an unmodified metasternum. Metasternal scent gland opening (omphalium) small but visible, marked by a small tubercle; scent channels prominent, curving slightly anterad to base of metacetabulae.

Abdomen without silvery setae or other adornment, except weak longitudinal pruinose line on midline of tergites IV-VII; with short paired longitudinal carinae on basal half of tergite II. Abdominal sternites set off from laterosternites by hair-free glabrous oval lacunae. Micropterous wing pads elongate.

Legs slender, long, hind legs very long; anterior femur set beneath with short light setae, unmodified in males; anterior tibia of male with a comb of minute black setae occupying 3/4 of tibial length; middle femora set ventrally with 4-5 very long slender setae; all tarsi long (fig. 3), claws moderately long; both up- and down curving arolia large, evident.

Male genital segments moderately large, protruding, modified; proctiger unmodified (fig. 4); parameres small, slender symmetrical, acuminate (fig. 2). Female tergite VIII on same plane as VII, truncate posteriorly; first gonocoxae small, barely exposed, plate-like; tergite IX of both sexes triangular, protruding posteriorly.

Type-species: *Tanyvelia missim* sp. n.

Remarks

Comparative notes. – Separable from other genera of Papuan Microveliinae by the characters given in the key. Similar in general appearance and ecological habits to *Baptista* Distant, but distinguished by the presence of a long grasping comb that runs nearly the entire length of the male fore tibia (fig. 3), and the absence of modifications to abdominal sterna VI and VII. Among the Papuan genera, *Tanyvelia* appears most closely allied to *Aegilipsicola*, but the pronotal collar is not as pronounced, the legs, although long and slender, are slightly stouter, and the fore tibial grasping comb is shorter. The proctiger of *Tanyvelia* is broadly rounded distally rather than coming to a rounded point as in *Aegilipsicola* (compare figs. 4 and 7), and the paramere is slender and elongate rather than short and stout (compare figs. 2 and 8).

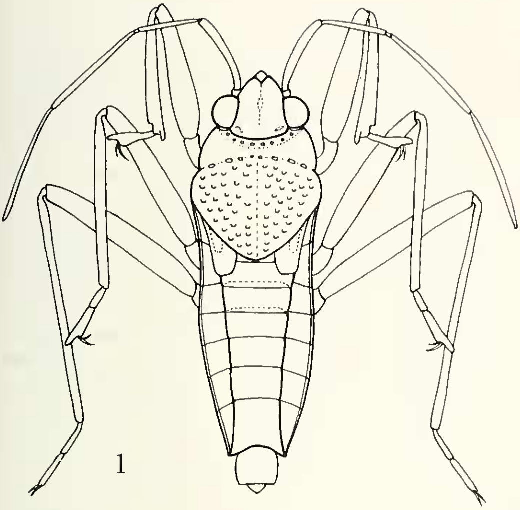
Etymology. – The generic name *Tanyvelia* is derived from *tany-* (Gr.), long, referring to the slender body shape, and *Velia*, the nominate genus of the family. Gender feminine.

Distribution. – New Guinea (fig. 27).

Tanyvelia missim sp. n.

(figs. 1-4, 27)

Type material: Holotype, micropterous male: Papua New Guinea, Morobe Prov., upper Poverty Creek on Mt. Missim, nr. Wau, 1600 m., 18 Sept.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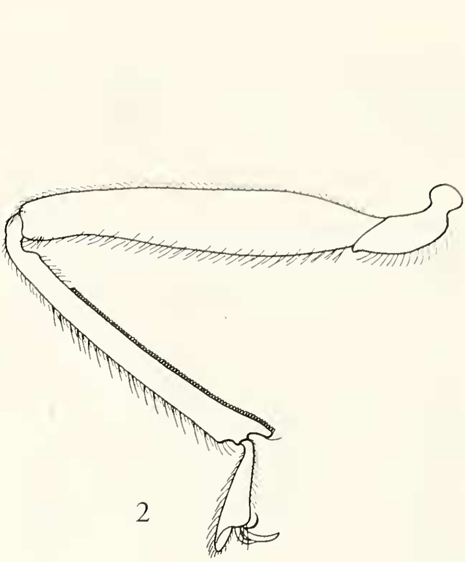
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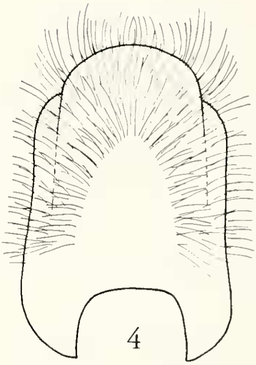
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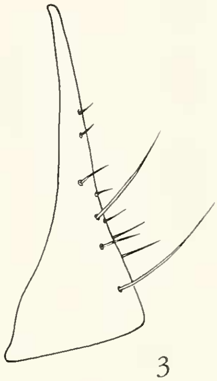
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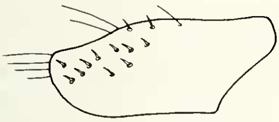
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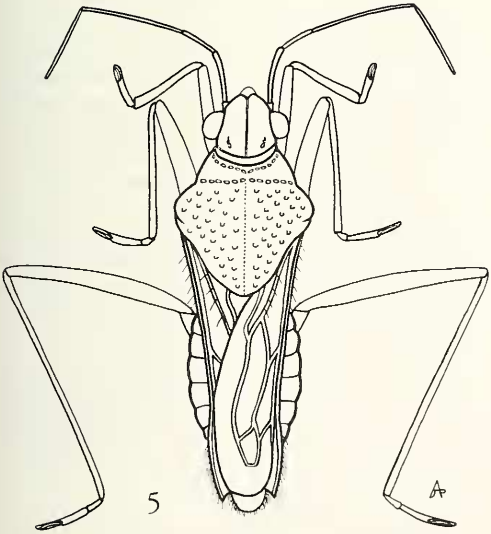
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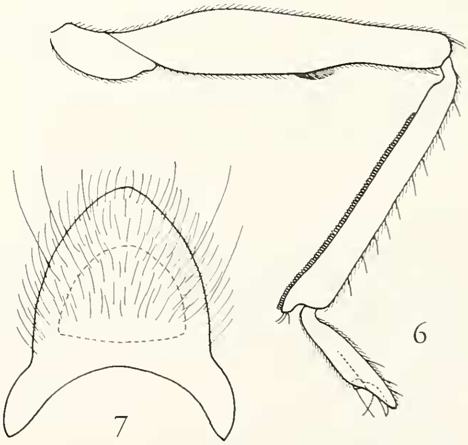
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Figs. 1-4. *Tanyvelia missim*, gen. n., sp. n. . – 1. Male, dorsal habitus; 2. Male foreleg; 3. Male paramere; 4. Male proctiger.
Figs. 5-8. *Aegilipsicola rapida*, gen. n., sp. n. – 5. Male, dorsal habitus; 6. Male foreleg; 7. Male proctiger; 8. Male paramere

1983, CL 1830, D. A. and J. T. Polhemus (BPBM). - Paratypes: 23 micropterous males, 12 micropterous females, same data as holotype (JTPC).

Diagnosis

Size. – Micropterous male, length 2.73-2.91 mm ($\bar{x}$ = 2.81, n = 10); width 0.79-0.90 mm ($\bar{x}$ = 0.86, n = 10). Micropterous female, length 2.81-3.13 mm ($\bar{x}$ = 2.96, n = 10); width 0.83-0.94 mm, ($\bar{x}$ = 0.88, n = 10).

Colour. – Micropterous male: ground colour black, venter and connexiva ringed with brown. Head black, brown ventrally; rostrum luteous on basal three segments, piceous distally. Pronotum with anterior lobe entirely yellowish including propleura, except narrowly embrowned medially; disc and collar black. Abdomen black, tergites mostly pruinose, lighter ventrally. Legs and antennae luteous to yellow brown, distally darker.

Structural characters. – Micropterous male: head of moderate length, declivant anteriorly; length 0.47; width of eye/interocular space, 0.16/0.30. Pronotum length:width, 0.74 : 0.81. Abdominal tergites not shining; tergites, II-VI subequal in length (0.16-0.19), VII longer (0.30). Abdominal venter set with short appressed setae; ventrite VII with a short V-shaped depression on caudal half. Legs, antennae thickly clothed with short to moderate length setae, with scattered longer setae. Legs unarmed.

Antennal formula, segments I : II : III : IV; 0.51 : 0.40 : 0.70 : 0.70.

Proportions of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.79 : 0.77 : 0.30 : 0.0; of middle leg, 1.07 : 1.05 : 0.14 : 0.28; of hind leg, 1.16 : 1.47 : 0.23 : 0.30.

First genital segment with an antero-ventrally directed tuft of stiff dark setae. Paramere small, long, triangular (fig. 2).

Micropterous female: Similar to male in most respects, but somewhat larger; connexiva vertical or reflexed over dorsum except in gravid specimens.

Remarks

Comparative notes. – Recognized among the Papuan Microveliinae by its elongate form with long legs and antennae (fig. 1), relatively unmodified male foreleg with a long tibial grasping comb (fig. 3), acuminate paramere (fig. 2), and elongate male proctiger (fig. 4).

Biological notes. – Upper Poverty Creek at the Mt. Missim type locality was a small, rocky headwater stream dropping steeply through a boulder-strewn bed heavily shaded by primary rain forest.

Etymology. – The name '*missim*' is a noun in apposition and refers to the Mt. Missim type locality.

Distribution. – Eastern New Guinea (fig. 27).

Aegilipsicola gen. n.
(figs. 5-8, 28)

Diagnosis

Size. – Macropterous form, length of males 2.70-2.84 mm, females 3.16-3.31 mm, general body characteristics not sexually dimorphic, but males slightly smaller.

Colour. – Macropterous form: ground colour blackish brown, tinged with yellowish brown; dorsally dark brown on head and ventrally, wings black, brown to black beneath; anterior pronotal lobe narrowly yellowish on either side of midline, laterally dark but covered with silvery pubescence except medially, demarcated from dark collar and posterior lobe. Hemelytra black, bearing six elongate bluish-grey pruinose streaks, with two confined within the basal cells, and four others on distal third (fig. 5)

Structural characters. – Only macropterous form known. Form elongate, slender (fig. 5); eyes globose, exserted beyond anterolateral pronotal angles, separated by about twice the width of an eye, removed from anterior pronotal margin, with short ocular setae. Head moderately declivant anteriorly, recessed into pronotum, posterior margin sloping somewhat caudo-dorsally, with usual three pairs of facial trichobothria; gular region long, plainly visible, rostral cavity closed posteriorly by a strong carinate ridge. Rostrum reaching to middle of mesosternum, segment I short, enclosed in rostral cavity, I and IV subequal in length and about three times longer than II, segment III about 8 times as long as II. Antennae very slender, very long, about 2/3 of body length. Pronotum slightly raised medially, with weak median longitudinal carina marked by a line of golden pubescence; collar prominent, distinctly set off by a row of deep foveae, terminating laterally; near ventral eye margins; anterior and posterior lobes set off by a transverse row of foveae, evanescent medially; entire pronotum sparsely set with fine decumbent golden pubescence; posterior lobe with numerous obscure shallow foveae, humeri moderately prominent, almost triangular, narrowly rounded posteriorly. Thoracic venter not diagnostic, with weakly formed tubercles on either side of mesosternal midline along posterior margin opposing an unmodified metasternum. Metasternal scent gland opening (omphalium) not visible; scent channels prominent, curving anterad to base of metacetabulae.

Abdomen without silvery setae or other adornment; prominent paired longitudinal carinae present on basal half of tergite II in macropters (visible only after removal of wings). Abdominal sternites set off from laterosternites by hair-free glabrous oval lacunae. Female connexiva expanded, plate like along tergite VII. Macropters with five closed cells in hemelytra, venation of fore and hind wings similar to figs. 312-313 in Andersen (1982) except distal cell closed; fore wings set with fine semi-recumbent stiff setae on basal half; micropterous form unknown.

Legs slender, long, hind legs very long; anterior femur set beneath with short light setae, with ventral tubercle at distal 2/3 in males; anterior tibia of male with a fine line of minute black setae occupying 4/5 of tibial length; femora ventrally without long setae; all tarsi long (fig. 6), claws very long; both up- and down curving arolia long, slender.

Male genital segments moderately large, protruding, modified; proctiger unmodified (fig. 7); parameres small, slender, symmetrical (fig. 8). Female tergite VIII on same plane as VII, protruding posteriorly over tergite IX; first gonocoxae small, barely exposed, plate-like; tergite IX of both sexes button-like, protruding posteriorly.

Type-species: *Aegilipsicola rapida* sp. n.

Remarks

Etymology. – The generic name *Aegilipsicola* is derived from *Aegilips* (Gr.), sheer, steep, referring to the habitat, and *-cola*, (L.), inhabitant. Gender feminine.

Comparative notes. – In general facies *Aegilipsicola* most closely resembles the Neotropical genus *Aegilipsivelia*, however this similarity is apparently due to convergence. Although the two genera share many similar structures adapted to life on steep hygropetric habitats, such as long legs and extremely long claws, *Aegilipsivelia* lacks the carinate rostral cavity on the gula, the bright pruinose hemelytral markings, and the carinate female connexiva seen in *Aegilipsicola*. In addition, the collar in *Aegilipsivelia* is set off by a sulcus rather than a row of deep foveae, and the comb-like process on the male fore tibia is relatively short instead of almost as long as the tibia.

Among Papuan genera of Microveliinae *Aegilipsicola* is apparently most closely allied to *Tanyvelia* gen. n. (see discussion under *Tanyvelia*)

Distribution. – Eastern New Guinea (fig. 28).

Aegilipsicola rapida sp. n.
(figs. 5-8, 28)

Type material: Holotype, macropterous male: Papua New Guinea, Morobe Prov., seeps along Mt. Kaindi road nr. Kunai Creek, above Wau, 17 Sept. 1983, CL 1823, D. A. and J. T. Polhemus (BPBM). – Paratypes: 39 macropterous males, 37 macropterous females, 62 immatures, same data as holotype (JTPC); 4 macropterous males, 4 macropterous females, 2 immatures, Morobe Prov., Namie Creek, Mt. Kaindi, 17 Sept. 1983, CL 1829, J. T. & D. A. Polhemus (JTPC); 1 macropterous female, Morobe Prov., Kunai River, 1500 m, 10 Oct. 1966, Illies (ZBSM).

Diagnosis

Size. – Macropterous male, length 2.70-2.84 mm ($\bar{x}$ = 2.74, n = 10); width 0.86-0.97 mm ($\bar{x}$ = 0.94, n = 10). Macropterous female, length 3.06-3.31 mm ($\bar{x}$ = 3.16, n = 10); width 1.01-1.12 mm, ($\bar{x}$ = 1.04, n = 10).

Colour. – Macropterous male: ground colour black, tinged with yellowish brown ventrally. Head black; two longitudinal regions between eyes and medial furrow, posterior margin, brown. Pronotum with anterior lobe narrowly, transversely orange brown on either side of midline, extending to inner eye margins; posterior lobe uniformly black. Hemelytra blackish brown, long, extending beyond tip of abdomen. Abdomen brownish yellow ventrally, with a broad brown longitudinal stripe along sternal-laterosternal boundary. Legs yellowish, darker distally; antennae brown, segment I yellowish basally.

Structural characters. – Macropterous male: head of moderate length, declivant anteriorly; length 0.51; width of eye/interocular space, 0.14/0.30. Pronotum long, humeri evident but not raised; length : width, 0.84 : 0.91.

Abdominal venter set with very short appressed fine setae; venter VII depressed on either side of midline; first genital segment excavated ventrally, with three small brown sclerotized denticles distally. Legs, antennae thickly clothed with short inconspicuous setae, without longer setae. Legs unarmed, except fore femur set near distal 2/3 with patch of short stiff setae (fig. 6).

Antennal formula I : II : III : IV; 0.40 : 0.28 : 0.74 : 0.60.

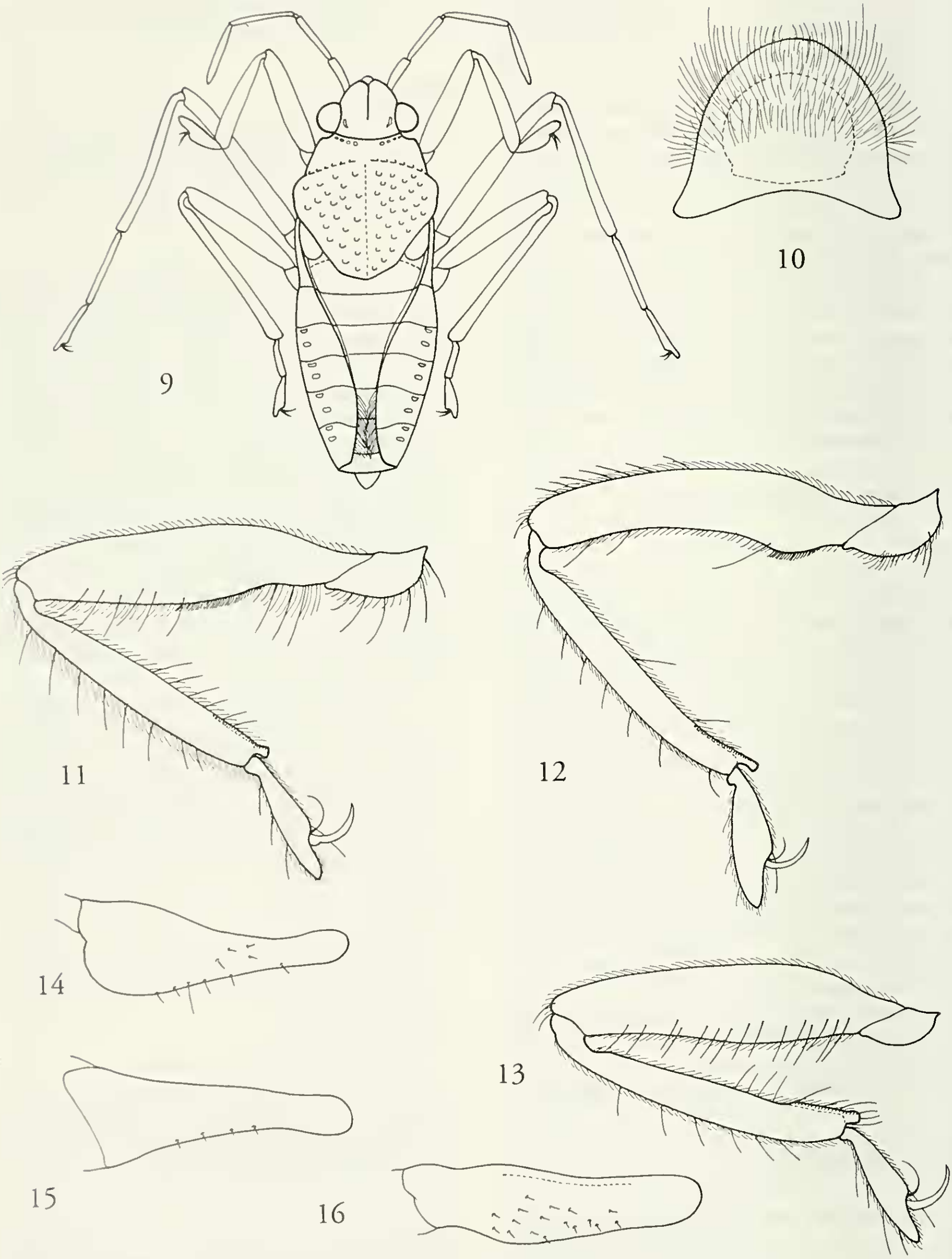
Proportions of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.74 : 0.60 : 0.28 : 0.0; of middle leg, 1.00 : 0.98 : 0.12 : 0.33; of hind leg, 1.44 : 1.74 : 0.09 : 0.40.

Paramere small, short, ovate (fig. 8).

Macropterous female: Similar to male in most respects, but somewhat larger. Connexiva vertical, strongly raised and plate-like along tergite VII, produced posteriorly along tergite VIII.

Remarks

Comparative notes. – Easily recognized among the Papuan Microveliinae by its elongate form (fig. 5), broadly pointed proctiger (fig. 7), short and broad paramere (fig. 8), elongate fore tibial grasping comb



Figs. 9-16. *Tarsovelia* gen. n. – 9. *Tarsovelia alta* sp. n., micropterous female, dorsal habitus; 10. *Tarsovelia dani* sp. n., male proctiger; 11-13. Male forelegs of *Tarsovelia* species, 11. *Tarsovelia arfak* sp. n.; 12. *Tarsovelia dani* sp. n.; 13. *Tarsovelia alta* sp. n.; 14-16. Male parameres of *Tarsovelia* species. 14. *Tarsovelia dani* sp. n.; 15. *Tarsovelia alta* sp. n.; 16. *Tarsovelia arfak* sp. n.

(fig. 6), and small tuft of black setae ventrally on the male fore femur (fig. 6).

Biological notes. – The type series was taken from wet seeping vertical rock faces formed by road cuts along the Mt. Kaindi road. The insects were abundant, and ran across the wet rocks and moss with great speed and agility.

Etymology. – The name '*rapida*' refers to the speed with which these insects can move across vertical rock faces.

Distribution. – Eastern New Guinea (fig. 28).

Tarsovelia gen. n.
(figs. 9-16, 29)

Diagnosis

Size. – Length of males 2.41-2.95 mm, females 2.77-3.45 mm, general body characteristics and size sexually dimorphic, males smaller, female abdomen more robust.

Colour. – Ground colour brown to blackish brown, often blackish above, without silvery pubescence; winged forms dorsally black, wings black, brown to black beneath. Anterior pronotal lobe and collar usually entirely yellowish to orange brown, only in *T. arfak* dark laterally.

Structural characters. – Form robust (fig. 9); eyes globose, exserted but usually not beyond anterolateral pronotal angles, separated by at least twice the width of an eye, appressed to anterior pronotal margin, with long ocular setae. Head declivant anteriorly, slightly recessed into pronotum, with usual three pairs of facial trichobothria; gular region moderately long, plainly visible, rostral cavity closed posteriorly. Rostrum reaching almost to metasternum, segment I short, enclosed in rostral cavity, segments I and IV subequal in length and about three times longer than II, segment III about 8 times as long as II. Antennae slender, long, about 1/2 of body length.

Pronotum of micropterous form slightly raised medially; collar weakly formed, set off by a ragged row of small dark foveae, terminating under eyes laterally; anterior and posterior lobes set off by a transverse row of small foveae in a weak transverse sulcus, evanescent medially; anterior lobe set with stiff erect setae; posterior lobe with numerous shallow depressions, humeri not prominent, broadly rounded posteriorly, not modified, covering metanotum. Pronotum of alate form longer, rounded posterior margin extending farther caudad, almost triangular, humeri more prominent. Thoracic venter not diagnostic, with weakly formed tubercles on either side of mesosternal midline on posterior margin opposing an unmodified metasternum. Metasternal scent gland opening (omphalium) not evident; scent channels prominent, angled slightly anterad to base of metacetabulae.

Abdomen without silvery setae or other adornment, except weak longitudinal pruinose line on midline of tergites IV-VII; prominent paired longitudinal carinae on tergite II of macropters (visible only after removal of wings), absent in micropterous form. Abdominal sternites set off from laterosternites by hair-free round or oval lacunae. Micropters with elongate white wing pads, often infuscated distally; macropters with four closed cells in dark hemelytra with white region basally; venation of fore and hind wings similar to figs. 312-313 in Andersen (1982); female fore wing Sc often terminating in a triangular thickened region, resulting in a slight to pronounced sinuosity of the wing margin; fore wings set with long dark stiff erect setae on basal half, much more pronounced in females.

Legs slender; anterior femur set beneath with short light setae, sometimes slightly modified in males (figs. 11-13); anterior tibia with a distal comb of many stiff setae; middle and anterior femora set ventrally with numerous long slender setae; middle tibia set with an evenly spaced row of about 10 erect setae beginning at basal third, very long basally, decreasing in length distally; middle tarsi extremely long (fig. 9); claws short; both up- and down curving arolia evident, but very slender.

Male genital segments small, not protruding, unmodified; proctiger unmodified; parameres small, slender symmetrical (figs. 14-16). Female tergite VIII on same plane as VII, truncate posteriorly; first gonocoxae small, barely exposed, plate-like; tergite IX small, button-like, protruding posteriorly.

Type-species: *Tarsovelia alta* sp. n.

Remarks

Comparative notes. – *Tarsovelia* is similar in general facies to *Microvelia*, but is easily separated from this genus and all other Microveliinae by the elongate middle tarsi (fig. 9), which are adapted for rowing rather than running. In addition, the light colored markings on the hemelytra of *Tarsovelia* are restricted to the basal angles, plus occasionally a weak medial fascia, whereas in the type-species of *Microvelia* (*M. pulchella* Westwood) the hemelytra also bear ovate light spots in every closed cell, plus a large bright spot in the open distal cell.

Biological notes. – *Tarsovelia* species are found along the margins of flowing pools on rocky mountain streams. They are swift and agile skaters if disturbed, and will fly readily if captured in a net.

Etymology. – The generic name *Tarsovelia* is derived from *tarsos* (Gr.), referring to the extremely long slender middle tarsi, and *Velia*, the nominate genus of the family. Gender feminine.

Distribution. – New Guinea (fig. 29).

Key to the species of *Tarsovelia*

Males

1. Fore femur with patch of short, stiff hairs on ventral surface (figs. 11, 12) 2

– Fore femur lacking patch of short, stiff hairs on ventral surface (fig. 13) .... *T. alta* sp. n.

2. Fore femur with patch of short, stiff hairs near middle of ventral margin (fig. 11) .... *T. arfak* sp. n.

– Fore femur with patch of short, stiff hairs near base of ventral margin (fig. 12) ..... *T. dani* sp. n.

Tarsovelia alta sp. n.

(figs. 9, 13, 15, 29)

Type material: Holotype, micropterous male: Papua New Guinea, Morobe Prov., bog nr. Mt. Kaindi summit, above Wau, 17 Oct. 1983, CL 1825, D. A. and J. T. Polhemus (BPBM). – Paratypes: 13 micropterous males, 14 micropterous females, 16 immatures, same data as holotype (ZMUC, JTPC, BPBM).

Additional material examined: 2 macropterous females, Papua New Guinea, Morobe Prov., Eddie Creek, 2050 m, 11 Oct. 1966, Illies leg. (ZBSM, JTPC); 1 macropterous female, Morobe Prov., Poverty Creek, Mt. Missim, 18 Sept. 1983, CL 1830, 1600 m, J. T. & D. A. Polhemus (JTPC); 9 macropterous males, 6 macropterous females, 2 immatures, Western Highlands Prov., rocky stream 17 km N. of Mt. Hagen on Baiyer River road, 6 and 8 Sept. 1983, CL 1780, D. A. and J. T. Polhemus (JTPC).

Diagnosis

Size. – Micropterous male, length 2.41-2.48 mm ($\bar{x}$ = 2.44, n = 10); width 0.83-0.89 mm ($\bar{x}$ = 0.85, n = 10). Micropterous female, length 2.81-2.88 mm ($\bar{x}$ = 2.84, n = 4); width 0.94-1.01 mm, ($\bar{x}$ = 0.99, n = 4). Macropterous male, length 2.77-2.95 mm ($\bar{x}$ = 2.87, n = 9); width 1.10-1.15 mm ($\bar{x}$ = 1.14, n = 9). Macropterous female, length 3.31-3.45 mm ($\bar{x}$ = 3.36, n = 6); width 1.19-1.33 mm, ($\bar{x}$ = 1.28, n = 6).

Colour. – Micropterous male: ground colour orange brown, venter slightly lighter. Head dark orange brown, lighter beneath; rostrum luteous medially, piceous distally. Pronotum with anterior transverse band orange brown, extending onto propleura; disc dark brown, mottled with lighter brown. Abdomen orange brown, tergal margins darker, lighter ventrally. Distal segements of legs, antennae brown, basal segments lighter.

Structural characters. – Micropterous male: head of moderate length, declivant anteriorly; length 0.37; width of eye/interocular space, 0.14/0.30. Pronotum long, covering metanotum, humeri evident but not raised; length:width, 0.84 : 0.86. Abdominal tergites not shining; lengths of tergites, II : 0.14; III : 0.16; IV-VI : 0.19; VII : 0.26.

Abdominal venter not modified, set with short appressed setae. Legs, antennae thickly clothed with short to moderate length setae, with scattered longer setae. Legs unarmed.

Antennal formula I : II : III : IV; 0.29 : 0.33 : 0.37 : 0.42.

Proportions of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.65 : 0.63 : 0.28 : 0.0; of middle leg, 0.98 : 0.93 : 0.42 : 0.35; of hind leg, 0.86 : 1.00 : 0.19 : 0.29.

Paramere small, long, slender (fig. 15).

Micropterous female: Similar to male in most respects, but somewhat larger; connexiva reflexed over dorsum except in gravid specimens.

Macropterous male: Similar to micropterous form in most respects. Pronotum with anterior lobe entirely orange brown, extending onto propleura; posterior lobe uniformly dark. Hemelytra blackish brown, basally entirely white except slight infuscation of Sc, white region extending beyond tip of pronotum.

Macropterous female: Very similar to macropterous male, except lateral hemelytral margin slightly sinuate at distal thickening of Sc. Posterior lobe of pronotum with two (1+1) tufts of erect stiff black setae on either side of midline at about middle. Connexival margin vertical.

Remarks

Comparative notes. – *T. alta* sp. n. may be separated from *T. dani* sp. n. and *T. arfak* sp. n. by the unmodified male fore femur (fig. 13), brownish coloration in wingless forms, male paramere shape (fig.15), and length of the second segment of the hind tarsi, which is about 1.5 times as long as the first (versus only slightly longer in the other two species). In *T. arfak* sp. n. the anterior femora are dark distally, and the middle and posterior femora plus all the tibiae and tarsi are dark brown to black, while in *T. alta* sp. n. and *T. dani* sp. n. all femora are largely light brown, and the tibiae and tarsi are dark brown but not black. In the macropters of *T. alta* sp. n. and *T. arfak* sp. n. the entire basal angle of the hemelytra is white (including the veins, although these are occasionally slightly darkened), whereas in *T. dani* sp. n. the veins are dark and the light coloring is often a sordid white.

We originally considered the micropterous and macropterous specimens at hand from Papua New Guinea to represent different taxa. However with two additional new species now available from Irian Jaya that show marked differences from the Papua New Guinea material, we have now concluded that the latter represent but a single, albeit somewhat variable, species. We have thus included all of the specimens from eastern New Guinea under *T. alta* sp. n., but the macropters are not named as paratypes. Macropterous specimens from Eddie Creek and Poverty Creek (not measured) have very long hemelytra, considerably exceeding the tip of the abdomen, and they are lighter in color than specimens from Mt. Hagen. Measurements of leg and antennal segments are not helpful, as they appear to vary randomly between populations, thus we defer the final decision about the specific distinctness of these populations from Papua New Guinea until more material, hopefully including both micropters and macropters in the same sample, is available.

Biological notes. – Near Mt. Hagen *T. alta* was found in a plunge pool below a small cascade, with individuals hiding in the crevices of a sheer rock wall. When disturbed the insects would skate rapidly over the water near the wall until disappearing into their hiding places once more. By contrast, the Mt. Kaindi specimens were taken from beneath a large, partly submerged log in a bog pool, where violent flushing was required to dislodge them. So far this species has been found only at altitudes above 1200 meters.

Etymology. – The name '*alta*' refers to the high elevation at which this species was taken.

Distribution. – Eastern New Guinea (fig. 29).

Tarsovelia arfak sp. n.
(figs. 11, 16, 29)

Type material: Holotype, macropterous male: Indonesia, Irian Jaya Prov., Saumarin River, nr. Warkomi, Arfak Mountains, 42 km S. of Manokwari, 90 m, water temp. 25° C, 18 Oct. 1991, CL 2647, D. A. and J. T. Polhemus (USNM). – Paratypes: 67 macropterous males, 48 macropterous females, 6 immatures, same data as holotype (JTPC).

Diagnosis

Size. – Macropterous male, length 2.45-2.77 mm ($\bar{x}$ = 2.62, n = 10); width 1.01-1.12 mm ($\bar{x}$ = 1.06, n = 10). Macropterous female, length 2.81-3.09 mm ($\bar{x}$ = 2.98, n = 10); width 1.15-1.19 mm, ($\bar{x}$ = 1.17, n = 10).

Colour. – Macropterous male: ground colour black, tinged with brown. Head black. Pronotum with anterior lobe and collar medially orange brown, extending to inner eye margins; posterior lobe uniformly black. Hemelytra blackish brown, long, extending beyond tip of abdomen, basally with broad elongate rectangular white region along outer margin, extending beyond tip of pronotum. Abdomen black, ventrally tinged with brown along connexival margins and caudally. Legs, antennae brown, fore femur yellowish except distally, mid and hind femora yellowish ventrally.

Structural characteristics. – Macropterous male: head of moderate length, declivant anteriorly; length 0.40; width of eye/interocular space, 0.12/0.33. Pronotum long, humeri evident but not raised; length:width, 0.86 : 1.00.

Abdominal venter not modified, set with short appressed setae. Legs, antennae thickly clothed with short to moderate length setae, with scattered longer setae; all tibia, middle and hind tarsi set with rows of long setae dorsally, in addition to long ventral setae. Legs unarmed, except fore femur ventrally slightly excavate basally, set near middle with patch of short stiff setae (fig. 11).

Antennal formula I : II : III : IV; 0.28 : 0.33 : 0.35 : 0.40.

Proportions of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.65 : 0.51 : 0.28 : 0.0; of middle leg, 0.88 : 0.81 : 0.49 : 0.35; of hind leg, 0.81 : 0.95 : 0.23 : 0.28.

Paramere small, long, slender (fig. 16).

Macropterous female: Similar to male in most respects, but somewhat larger; hemelytra with lateral margin sinuate, thickened and set with long dense black setae at distal Sc. Connexiva vertical along tergites II-IV, slightly reflexed over tergites V-VII.

Remarks

Comparative notes. – Recognized by the patch of short stiff black setae on the ventral margin of the male fore femur (fig. 11), and the shape of the male paramere (fig. 16). For additional comparative notes see key, and discussion under *T. alta* sp. n.

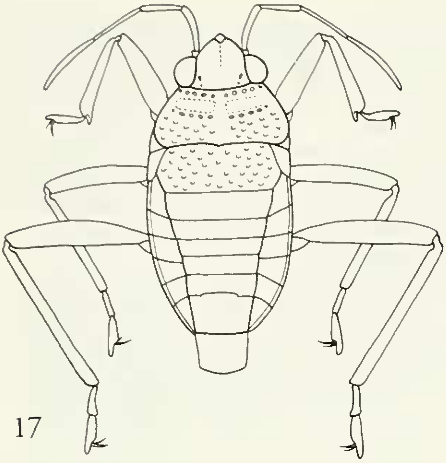
Biological notes. – The Saumarin River at the type locality was a moderate sized stream dropping steeply to the sea off the flanks of the Arfak Mountains through a bed of boulders, cobbles and sand, heavily shaded by primary rain forest. The srream profile was punctuated by numerous small waterfalls, and *T. arfak* was most abundant on the plunge pools below these falls.

Etymology. – The name '*arfak*' is a noun in apposition and refers to the Arfak Mountain type area.

Distribution. – Western New Guinea (Vogelkop Peninsula) (fig. 29).

Tarsovelia dani sp. n.
(figs. 10, 12, 14, 29)

Type material: Holotype, macropterous male: Indonesia, Irian Jaya Prov., swift rocky stream in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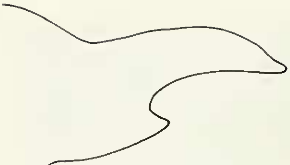
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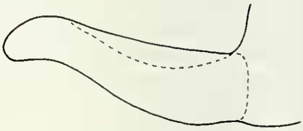
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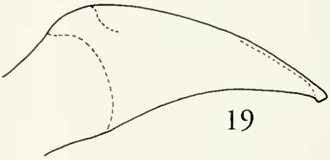
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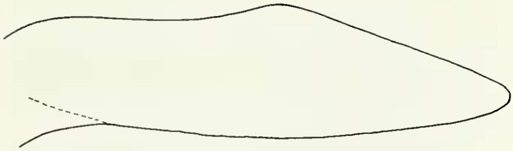
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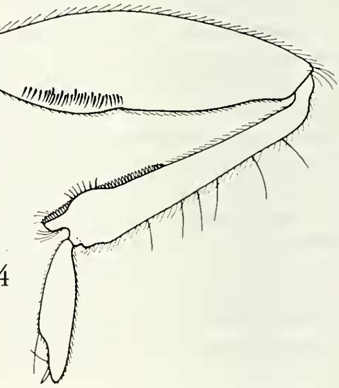
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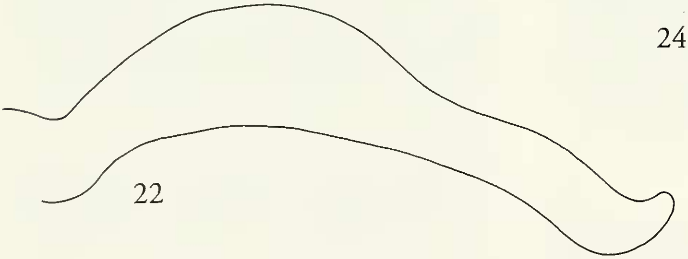
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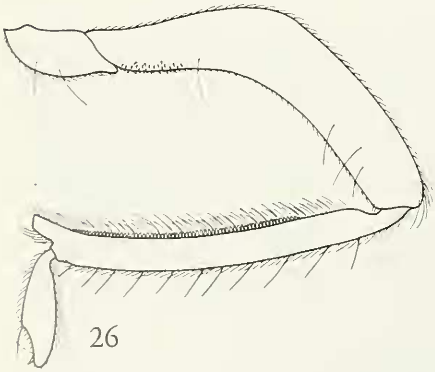
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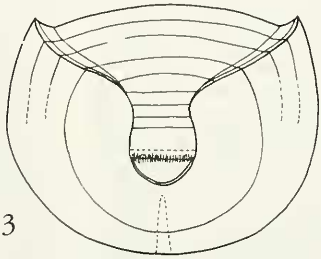
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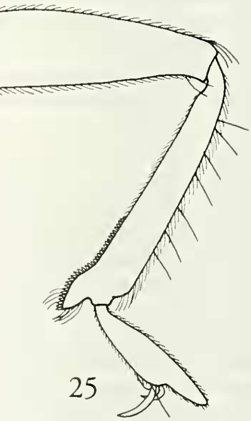
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upper Pass Valley, 52 km NE of Wamena, 2015 m., water temp. 14°C, 23 Sept. 1991, CL 2614, D. A. and J. T. Polhemus (USNM). - Paratypes: 61 macropterous males, 26 macropterous females, 28 immatures, same data as holotype (JTPC).

Diagnosis

Size. – Macropterous male, length 2.55-2.95 mm ($\bar{x}$ = 2.78, n = 10); width 1.01-1.15 mm ($\bar{x}$ = 1.09, n = 10). Macropterous female, length 2.99-3.45 mm ($\bar{x}$ = 3.12, n = 10); width 1.15-1.37 mm, ($\bar{x}$ = 1.22, n = 10).

Colour. – Macropterous male: Ground colour orange brown, marked with black. Head blackish brown dorsally, ventrally lighter. Pronotum with anteriot lobe and collar orange brown, extending onto propleura, collar marked only laterally, demarcated by a row of dark foveae; posterior lobe uniformly black. Hemelytra blackish brown, basally with narrow elongate white stripe along costal margin, extending beyond tip of pronotum, plus a shorter sordid white region basally along pronotum; with elongate grayish brown streak in middle, barely visible in some specimens; length variable, shortest reaching barely onto tergite VII, longest almost coveting genital segments. Abdomen orange brown. Legs, antennae brown, fore femur yellowish except distally, mid and hind femora, tibia yellowish ventrally.

Structural characteristics. – Macropterous male: head of moderate length, declivant anteriorly; length 0.38; width of eye/interocular space, 0.14/0.30. Pronotum long, humeri evident but not raised; length:width, 1.00 : 1.12.

Abdominal venter not modified, set with short appressed setae. Legs, antennae thickly clothed with short to moderate length setae, with scattered longer setae. Legs unarmed, except fore femur flattened ventrally, curved, basally with a tuft of stiff setae (fig. 12).

Antennal formula I : II : III : IV; 0.30 : 0.35 : 0.42 : 0.42.

Proportions of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.74 : 0.72 : 0.30 : 0.0; of middle leg, 1.12 : 1.02 : 0.49 : 0.35; of hind leg, 0.98 : 1.07 : 0.26 : 0.33.

Paramere small, long, slender (fig. 14).

Macropterous female: Similar to male in most respects, but somewhat larger. Hemelytra length variable, shorter than in male, shortest not reaching tergite VII, longest reaching caudal margin of tergite VII; with lateral margin weakly sinuate, narrowly thickened and set with stiff setae at distal Sc. Connexiva vertical along tergites II-III, IV in transition, strongly reflexed over tergites V-VII.

Remarks

Comparative notes. – Recognized by the small tuft of black setae basally on the ventral surface of the weakly bowed male fore femur (fig. 12), and the shape of the male paramere (fig. 14). For additional comparative notes see key, and discussion under *T. alta* sp. n.

Biological notes. – The type series of *T. dani* was taken from pools along a very swift, cold mountain stream in a limestone bed bordered by *Nothofagus* and *Rhododendron* forest. The insects were most common along the pool margins, skating rapidly across the water if disturbed and flying readily if taken in a net.

Etymology. – The name '*dani*' is a noun in apposition and refers to the native Dani people who inhabit the type area.

Distribution. – Central New Guinea (fig. 29).

Neusterinsifer gen. n.
(figs. 17-26, 30)

Diagnosis

Size. – Form stout (fig. 17), length of males 1.87-2.48 mm, females 1.91-2.77 mm, general body characteristics and size sexually dimorphic, males smaller, female abdomen more robust.

Colour. – Ground color black, tinged with orange brown, heavily marked with silvery pubescence; anterior pronotal lobe orange brown on posterior half, with streak extending from near midline to middle of eyes, weakly demarcated from collar and posterior lobe.

Structural characteristics. – Both apterous and macropterous forms known. Eyes globose, exserted but usually not beyond anterolateral pronotal angles, separated by about twice the width of an eye, appressed to anterior pronotal margin, with moderately long ocular setae. Head strongly declivant anteriorly, recessed into pronotum, posterior margin almost vertical, with usual three pairs of facial trichobothria; gular region short, not visible, rostral cavity open posteriorly, with raised carinate bucculae. Rostrum reaching to middle of mesosternum, segment I short, enclosed in rostral cavity, I and IV subequal in length

Figs. 17-26. *Neusterinsifer* gen. n. – 17. *Neusterinsifer compactus* sp. n., micropterous male, dorsal habitus; 18-22. Processes arising from male proctigers of *Neusterinsifer* species, 18. *Neusterinsifer compactus* sp. n.; 19. *Neusterinsifer cyclops* sp. n.; 20. *Neusterinsifer sepik* sp. n.; 21. *Neusterinsifer nabire* sp. n.; 22. *Neusterinsifer gladius* sp. n.; 23. *Neusterinsifer compactus* sp. n., posterior view of female abdomen showing anal plate formed by tergites VII and VIII. 24-26. Male forelegs of *Neusterinsifer* species: 24. *Neusterinsifer sepik* sp. n.; 25. *Neusterinsifer gladius* sp. n.; 26. *Neusterinsifer compactus* sp. n.

and about two times longer than II, segment III about four times as long as II. Antennae slender, very long, about 2/3 of body length.

Pronotum almost flat, without median carina; collar very weakly formed, set off by a ragged row of small dark foveae, terminaring under eyes laterally; anterior and posterior lobes set off by a transverse row of foveae; anterior lobe thickly set with appressed silvery setae except triangular median area; posterior lobe with numerous small foveae, humeri not formed, almost straight posteriorly, not modified, covering mesonotum. Metanotum almost as long as pronotum. Thoracic venter not diagnostic, with weakly formed tubercles on either side of mesosternal midline on posterior margin opposing an unmodified metasternum. Metasternal scent gland opening (omphalium) not visible, but marked by a tiny tubercle; scent channels prominent, curving slightly anterad to base of metacetabulae.

Abdomen with silvery setae laterally on tergites II, VII, VIII, covering most of tergites II-VI in females, less extensive in males; prominent paired longitudinal carinae on tergite II of macropters (visible only after removal of wings), absent in micropterous form. Abdominal sternites set off from laterosternites by small hair-free glabrous oval lacunae; laterosternite VII of both sexes set with small round tuft of stiff posterolaterally directed setae, near connexival margin at basal 2/5 in males, much closer to base in females.

Macropterous forms with four closed cells in dark hemelytra, occasionally with fifth distal cell closed; always with white elongate streak basally in outer basal cell, usually with faint to pronounced light areas in other cells; venation of fore and hind wings similar to figs. 312-313 in Andersen (1982).

Legs moderately stout, moderately long; anterior femur set beneath with short light setae, modified in males of some species, with a patch of stiff setae or denticles ventrally on basal half; anterior tibia of male with a comb of minute black setae occupying 2/5 to 1/2 of tibial length; all femora set ventrally with 7-12 long slender setae; all tarsi moderately long, claws moderately long; both up- and down curving arolia long, slender.

Male abdominal ventrites VI, VII modified; genital segments very large, protruding, highly modified, proctiger bearing a large sword-like appendage arising from anterior margin, directed antero-laterally beneath abdomen (figs. 18-22); segment IX, proctiger rotated by about 90°; parameres vestigial or absent. Female tergite VIII on same plane as VII basally, distally sharply deflected ventrad closing abdomen posteriorly except for protruding tip of proctiger (fig. 23); first gonocoxae hidden.

Type-species: - *Neusterinsifer compacta* sp. n.

Remarks

Comparative notes. – Very similar in general facies to *Microvelia* (fig. 17), but separated by sword-like projection on the male proctiger (figs. 18-22), the small tuft of stiff setae on laterotergite VII, and other characters as given in the generic key. Macropters differ from *Microvelia* and most other genera of Microveliinae in having a well defined long slender white streak basally in the outer cell (with only ill defined light areas in all other cells), and lacking the distal white spot that is characteristic of *Microvelia* and other closely related genera. The wing markings are similar to those of *Tenagovelia* Kirkaldy from Africa, but species in this latter genus are much larger and possess much longer legs.

Biological notes. – Species of *Neusterinsifer* are most commonly encountered in sheltered areas along the margins of stream pools, or on the surfaces of water filled potholes in bedrock exposures adjacent to flowing sections of streams.

Etymology. – The generic name *Neusterinsifer* is derived from *neuster* (Gr.), swimmer, and *ensifer* (L.), sword bearer. Gender masculine.

Distribution. – New Guinea (fig. 30).

Key to species of *Neusterinsifer*

1. Male process on proctiger bifurcate, short (fig. 21). Female abdomen strongly narrowed posteriorly, boat shaped .... *nabire* sp. n.
– Male process on proctiger not bifurcate, longer (figs. 18-20, 22). Female abdomen not strongly narrowed posteriorly, not boat shaped 2
2. Small species, male 1.87 mm, female 1.91 mm long. Male process on proctiger relatively short, broad, narrowly triangular distally (fig. 19 .... *cyclops* sp. n.
– Larger species, male at least 2.19 mm, female at least 2.27 mm long. Male process on proctiger long, relatively narrow, not triangular distally (figs. 18, 20, 22) 3
3. Relatively small species, males 2.19-2.27 mm, females 2.27-2.34 mm long. Process of male proctiger long, broad, expanded medially and distally (fig. 22); male fore femur with a row of 5-10 black spinules basally (fig. 25). Female connexival segment VII forming a small acute angle at level of caudal margin of tergite VII ...... *gladius* sp. n.
– Larger species, males 2.27-2.48 mm, females 2.37-2.77 mm long. Process of male proctiger long, narrow or broad, not expanded medially and distally (figs. 18, 20); male fore femur without a basal row of 5-10 black spinules, instead with either a basal row of many short stiff black setae, or unarmed. Caudal extreme of female con

nexival segment VII either forming an acute or obtuse angle, but without a small acute angle at level of caudal margin of tergite VII 4

4. Process of male proctiger long, slender, sharp distally (fig. 18); male fore femur strongly bowed, bearing small black denticles basally (fig. 26). Caudal extreme of female connexival segment VII forming an obtuse angle ..... *compactus* sp. n.
– Process of male proctiger long, broad (fig. 20); male fore femur not bowed, with a patch of black spinules basally (fig. 24). Caudal extreme of female connexival segment VII slightly produced posteriorly, forming an acute angle ... *sepik* sp. n.

Neusterinsifer compactus sp. n.
(figs. 17, 18, 23, 26, 30)

Type material: Holotype, apterous male: Papua New Guinea, Western Highlands Prov., Baiyer River, 53 km N. of Mt. Hagen, 6 and 8 Sept. 1983, D. A. and J. T. Polhemus (BPBM). - Paratypes: 19 apterous males, 12 apterous females, same data as holotype (JTPC); 1 apterous male, 3 apterous females, Western Highlands Prov., Baiyer River Bird Sanctuary, 8 Sept. 1983, CL 1792, J. T. & D. A. Polhemus (JTPC); 1 apterous male, Morobe Prov., Bamboo Creek, nr. Wau, 16 Sept. 1983, CL 1817, J. T. & D. A. Polhemus (JTPC); 4 apterous males, 1 apterous female, Morobe Prov., trib. to Bumbu River, N. of Lae, 20 Sept. 1983, CL 1836, J. T. & D. A. Polhemus (JTPC).

Diagnosis

Size. – Apterous male, length 2.37-2.48 mm ($\bar{x}$ = 2.43, n = 10); width 1.33-1.40 mm ($\bar{x}$ = 1.39, n = 10). Apterous female, length 2.63-2.77 mm ($\bar{x}$ = 2.70, n = 10); width 1.40-1.55 mm, ($\bar{x}$ = 1.50, n = 10).

Colour. – Apterous male: Ground colour blackish brown, venter slightly lighter, entire dorsum, laterotergites covered with fine appressed golden pubescence. Head black, orange brown beneath; rostrum fuscous medially, piceous distally. Pronotum with anterior transverse orange brown band barely interrupted medially; disc blackish brown. Abdomen blackish brown, lighter ventrally, connexiva margined with orange brown. Antennae brown; anterior legs yellowish, distally darkened; middle, hind legs dark brown, basally lighter; coxae, trochanters luteous.

Structural characters. – Apterous male: head of moderate length, declivant anteriorly, with weak impressed median line; length 0.40; width of eye/interocular space, 0.15/0.30. Pronotum long, covering metanotum, thickly set with obscure foveae, humeri depressed; length:width, 0.40 : 1.00. Metanotum length:width, 0.33 : 1.00. Abdominal tergites not shining; tergites II-VI subequal in length (0.14-0.16), VII longer (0.28).

Abdominal venter set with short appressed setae, and scattered longer setae caudally; venter VI posteriorly set with two (1+1) tufts of dense dark erect setae on either side of midline; venter VII broadly depressed medially, carinate along posterior margin. Legs, antennae thickly clothed with short to moderate length setae, with scattered longer setae. Middle and hind legs unarmed; fore femur strongly bowed, bearing a patch of black denticles basally, fore tibia with grasping comb extending 3/4 the length of the tibia (fig. 26).

Antennal formula I : II : III : IV; 0.35 : 0.28 : 0.40 : 0.51.

Proportions of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.65 : 0.60 : 0.28 : 0.0; of middle leg, 0.86 : 0.86 : 0.16 : 0.30; of hind leg, 0.93 : 1.07 : 0.17 : 0.30.

Proctiger produced anteriorly into a long slender sinuate ensiform process (fig. 18). Parameres vestigial or absent.

Micropterous female: Similar to male in most respects, but somewhat larger; connexiva vertical, incurved and slightly refexed at caudal extreme, which forms an obtuse angle.

Remarks

Comparative notes. – A relatively large species for the genus, recognized by the short, blunt process on the male proctiger (fig. 18), and the strongly bowed male foreleg with a patch of black denticles basally on the ventral surface (fig. 26). Similar in size and general facies to *N. sepik* sp. n., but this latter species possesses an unbowed foreleg with a large patch of black denticles (fig. 24), and a much larger and more pointed process on the male proctiger (fig. 20).

Biological notes. – The Baiyer River at the type locality was a swift, deep river flowing in a rocky bed with wet mossy banks, and partially shaded by disturbed upland rain forest. *N. compactus* was taken here skating on the surface of water filled potholes in an exposure of igneous rock along the river margin.

Etymology. – The name *compactus* (L.) refers to the shape of this species.

Distribution. – Eastern New Guinea (fig. 30).

Neusterinsifer cyclops sp. n.
(figs. 19, 30)

Type material: Holotype, apterous male: INDONESIA, Irian Jaya Prov., small rocky stream and spring above Sentani, Cyclops Mountains, 325 m, 25 Sept. 1991, CL 2618, J. T. & D. A. Polhemus (JTPC, to be placed in USNM when more material is available).

Diagnosis

Size. – Apterous male, length, $\bar{x}$ = 1.87, n = 1; width, $\bar{x}$ = 0.79, n = 1. Apterous female, length, $\bar{x}$ = 1.91, n = 1; width, $\bar{x}$ = 0.90, n = 1.

Colour. – Apterous male: Ground colour deep brown, marked with brown, venter slightly lighter, entire dorsum, laterotergites covered with fine appressed golden pubescence; entire dorsum, pleura, sides of abdomen covered with moderate length erect setae. Head brown, orange brown beneath; rostrum fuscous medially, piceous distally. Pronotum with anterior transverse orange brown band embrowned medially; disc blackish brown. Abdomen blackish brown, lighter ventrally, connexiva margined with orange brown. Antennae brown, base of segment I lighter; legs yellowish, distally darkened; femora darker posteriorly; coxae, trochanters luteous.

Structural characters. – Apterous male: head of moderate length, declivant anteriorly, with weak impressed median line; length 0.33; width of eye/interocular space, 0.12/0.30. Pronotum long, covering metanotum, thickly set with obscure foveae, humeri depressed; length:width, 0.28 : 0.79. Metanotum length:width, 0.26 : 0.79. Abdominal tergites not shining; tergites II-VI subequal in length (0.12-0.14), VII longer (0.26).

Abdominal venter set with short appressed setae; venter VI posteriorly set with two (1+1) tufts of dense dark erect setae on either side of midline, between them a V-shaped depression open posteriorly; venter VII broadly depressed medially, sharply excavated on posterior half, carinate along anterior margin of excavation. Legs, antennae thickly clothed with short to moderate length setae, with scattered longer setae. Middle and hind legs unarmed; foreleg lacking denticles or spinules, tibial comb extending for only 1/2 the length of the tibia.

Antennal formula I : II : III : IV; 0.21 : 0.19 : 0.33 : 0.40.

Proportions of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.51 : 0.44 : 0.19 : 0.0; of middle leg, 0.63 : 0.60 : 0.12 : 0.19; of hind leg, 0.74 : 0.86 : 0.12 : 0.26.

Proctiger produced anteriorly into a broad ensiform process (fig. 19). Parameres vestigial or absent.

Apterous female: Similar to male in most respects, but somewhat larger; connexiva vertical; caudal extreme gently curving ventrad.

Macropterous forms: unknown.

Remarks

Comparative notes. – Separable from all other *Neusterinsifer* species by its small size, and short, pointed process on the male proctiger (fig. 19).

Biological notes. – The type of *N. cyclops* was taken from a small, clear, spring fed stream at the margin of the remaining primary rain forest on the slopes of the Cyclops Mountains above Sentani. The stream flowed in a bed of metamorphic rocks intermixed with coarse grey sand, and was partially shaded by trees felled for garden clearings.

Etymology. – The name *cyclops*, a noun in apposition, refers to the mountain range where the species was found.

Distribution. – Northern New Guinea (Cyclops Mountains) (fig. 30).

Neusterinsifer gladius sp. n.

(fig. 22, 25, 30)

Type material: Holotype, apterous male: INDONESIA, Irian Jaya Prov., Nabire River and swift tributary, 5 km E. of Nabire, 60 m, 14 Oct. 1991, CL 2642, J. T. & D. A. Polhemus (USNM). - Paratypes: 2 apterous males, 2 apterous females, same data as holotype (JTPC).

Diagnosis

Size. – Apterous male, length 2.19-2.27 mm ($\bar{x}$ = 2.24, n = 3); width 0.90-0.94 mm ($\bar{x}$ = 0.91, n = 3). Apterous female, length 2.27-2.34 mm ($\bar{x}$ = 2.30, n = 2); width 1.01-1.04 mm, ($\bar{x}$ = 1.03, n = 2).

Colour. – Apterous male: Ground colour blackish brown, venter slightly lighter, entire dorsum, laterotergites covered with fine appressed golden pubescence; entire body except thoracic venter covered with long erect setae. Head black, orange brown beneath; rostrum fuscous medially, piceous distally. Pronotum with anterior transverse orange brown band sometimes interrupted medially; disc blackish brown. Abdomen blackish brown, lighter ventrally, connexiva margined with orange brown. Antennae brown; anterior femora luteous, distally darkened; anterior tibia, tarsi brown, darker distally; middle, hind legs brown dorsally, ventrally yellowish, femora basally lighter; coxae, trochanters luteous, tinged with fuscous.

Structural characters.- Apterous male: head of moderate length, declivant anteriorly, with weak impressed median line; length 0.35; width of eye/interocular space, 0.15/0.28. Pronotum long, covering metanotum, thickly set with obscure foveae, humeri depressed; length:width, 0.37 : 0.86. Metanotum length:width, 0.28 : 0.86. Abdominal tergites not shining; tergites II-VI subequal in length (0.12-0.14), VII longer (0.28).

Abdominal venter set with short appressed setae; venter VI posteriorly set with two (1+1) widely separated tufts of dense dark erect setae on either side of

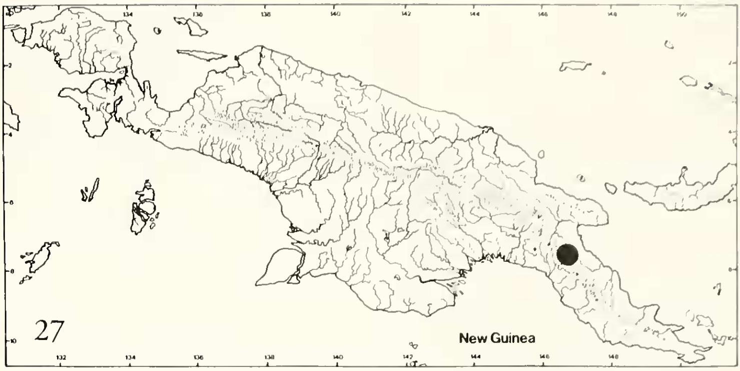

Fig. 27. Distribution of *Tanyvelia missim*, gen. n., sp. n.

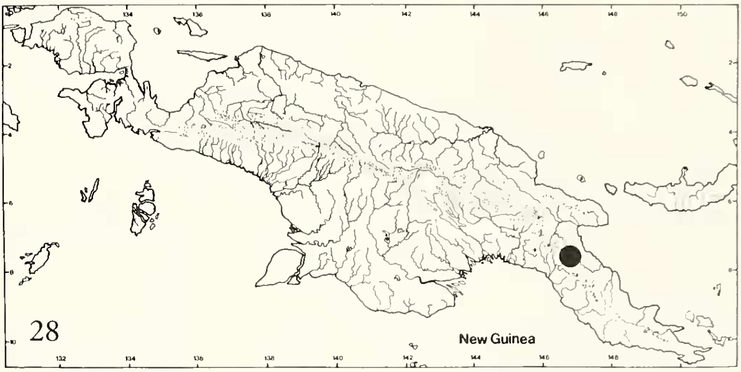

Fig. 28. Distribution of *Aegilipsicola rapida*, gen. n., sp. n.

midline, with shallow hair free sulcus between, extending the length of ventrites V-VI; venter VII broadly and strongly depressed medially. Legs, antennae thickly clothed with short to moderate length setae, with scattered longer setae. Middle and hind legs unarmed; fore tibia bearing a row of 5-10 black spinules basally; fore femur with grasping comb extending 1/2 the length of the tibia (fig. 25).

Antennal formula I : II : III : IV; 0.35 : 0.28 : 0.35 : 0.47.

Proportions of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.60 : 0.51 : 0.28 : 0.0; of middle leg, 0.79 : 0.74 : 0.16 : 0.30; of hind leg, 0.84 : 1.02 : 0.16 : 0.30.

Proctiger produced anteriorly into a long broad sinuate ensiform process, expanded medially and distally (fig. 22). Parameres vestigial or absent.

Apterous female: Similar to male in most respects, but somewhat larger; connexiva vertical; caudal extreme of VII forming an acute angle; VIII gently curving ventrad.

Macropterous forms: Unknown.

Remarks

Comparative notes. – Similar in size to *N. nabire* sp. n., but easily separable by the elongate process on the male proctiger (fig. 22), the patch of stiff, black spinules basally on the ventral surface of the male fore femur (fig. 25), and the relatively unmodified female abdomen which is not laterally compressed or boat-shaped.

Biological notes. – The Nabire River at the type locality was a swift, clear, moderate sized stream flowing in a rocky bed, and shaded by primary lowland rain forest. The type series of *N. gladius* was taken downstream of a limestone waterfall, where the banks of the river included numerous boulders and bedrock exposures. The insects were taken from the surfaces of water filled potholes and on still pools amid the rocks.

Etymology. – The name *gladius* (L.), refers to the ensiform process of the male proctiger.

Distribution. – Western New Guinea (fig. 30).

Neusterinsifer nabire sp. n.
(figs. 21, 30)

Type material: Holotype, apterous male: INDONESIA, Irian Jaya Prov., Nabire River and swift tributary, 5 km E. of Nabire, 60 m, 14 Oct. 1991, CL 2642, J. T. & D. A. Polhemus (USNM). - Paratypes: 98 apterous males, 13 macropterous males, 72 apterous females, 35 macropterous females, 32 immatures, same data as holotype (JTPC).

Diagnosis

Size. – Apterous male, length 2.01-2.09 mm ($\bar{x}$ = 2.04, n = 10); width 0.79-0.83 mm ($\bar{x}$ = 0.81, n = 10). Apterous female, length 2.19-2.41 mm ($\bar{x}$ = 2.27, n = 10); width 0.79-0.90 mm ($\bar{x}$ = 0.83, n = 10). Macropterous male, length 2.23-2.34 mm ($\bar{x}$ = 2.29, n = 6); width 1.04-1.12 mm ($\bar{x}$ = 1.10, n = 6). Macropterous female. length 2.41-2.55 mm ($\bar{x}$ = 2.46, n = 6); width 1.08-1.15 mm, ($\bar{x}$ = 1.12, n = 6).

Colour. – Apterous male: Ground colour blackish brown, venter slightly lighter, entire dorsum, laterotergites covered with fine appressed inconspicuous pubescence; dorsum, body laterally covered with long erect setae. Head black, orange brown beneath; rostrum fuscous medially, piceous distally. Pronotum with anterior transverse orange brown band broadly interrupted medially; disc blackish brown. Abdomen blackish brown, slightly lighter ventrally, connexiva margined with orange brown. Antennae brown; anterior femora yellowish, distally darkened, tibia brown; middle, hind legs dark brown to piceous, femora basally lighter; coxae, trochanters luteous, tinged with fuscous.

Structural characteristics. – Apterous male: head of moderate length, declivant anteriorly, with weak impressed median line; length 0.33; width of eye/interocular space, 0.14/0.28. Pronotum long, covering metanotum, thickly set with obscure foveae, humeri depressed; length:width, 0.37 : 0.81. Metanotum length:width, 0.28 : 0.79. Abdominal tergites not shining; tergites II-VI subequal in length (0.12-0.16), VII longer (0.30).

Abdominal venter set with short appressed setae; venter V posteriorly set with two (1+1) tufts of dense dark erect setae on either side of midline; venter VI with caudal margin medially produced, set with a large quadrate tuft of dense dark erect setae; venter VII excavated medially along posterior margin. Legs, antennae thickly clothed with short to moderate length setae, with scattered longer setae. Middle and hind legs unarmed; fore femur lacking denticles or spinules; fore tibia with grasping comb extending 1/2 the length of the tibia.

Antennal formula I : II : III : IV; 0.30 : 0.21 : 0.28 : 0.44.

Proportions of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.51 : 0.47 : 0.21 : 0.0; of middle leg, 0.70 : 0.63 : 0.12 : 0.23; of hind leg, 0.74 : 0.93 : 0.16 : 0.28.

Proctiger produced anteriorly into a bifurcate process (fig. 21). Parameres vestigial or absent.

Apterous female: Similar to male in most respects, but somewhat larger; abdomen narrowing posteriorly. Connexiva vertical, touching at caudal extreme; caudally rounded; thickly set along posterior margin with long stout dark setae; tuft of stiff posterolaterally directed setae near connexival margin of laterosternite VII of females pronounced, more so than in other species.

Macropterous male: Similar to apterous male in many respects, but broader, humeri more pronounced. Hemelytra always with light streaks in each of the two basal cells, often with light areas in all closed cells.

Macropterous female: Similar to apterous female in many respects, but broader, humeri more pronounced. Hemelytra with light areas in each of the four basal closed cells.

Remarks

Comparative notes. – Easily recognized by the bifurcate process on the male proctiger (fig. 21) and the laterally compressed, boat-shaped abdomen in females. This species is similar in size to *N. gladius* sp. n., and larger than *N. cyclops* sp. n., but smaller than either *N. compactus* sp. n. or *N. sepik* sp. n.

Biological notes. – See discussion under *N. gladius* sp. n.

Etymology. – The name '*nabire*', a noun in apposition, refers to the Nabire River type locality.

Distribution. – Northern New Guinea (fig. 30).

Neusterinsifer sepik sp. n.

(figs. 20, 24, 30)

Type material: Holotype, apterous male: Papua New Guinea, East Sepik Prov., Yemogu Creek, 2 km W. Tring, 12 Sept. 1983, CL 1805, J. T. & D. A. Polhemus (BPBM). - Paratypes: 11 apterous males, 6 apterous females, same data as holotype (JTPC); 1 apterous male, 4 apterous females, 1 macropterous female, East Sepik Prov., Mandi Creek, E. of Wewak, 10 Sept. 1983, CL 1797, J. T. & D. A. Polhemus (-JTPC); 4 apterous males, 1 apterous female, East Sepik Prov., Brandi Creek, nr. Wewak, 10 Sept. 1983, CL 1796, J. T. & D. A. Polhemus (JTPC).

Diagnosis

Size. – Apterous male, length 2.27-2.41 mm ($\bar{x}$ = 2.35, n = 10); width 0.94-1.01 mm ($\bar{x}$ = 0.99, n = 10). Apterous female, length 2.37-2.63 mm ($\bar{x}$ = 2.48, n = 10); width 0.97-1.15 mm, ($\bar{x}$ = 1.04, n = 10). Macropterous female, length, $\bar{x}$ = 2.62, n = 1); width, $\bar{x}$= 1.15, n = 1)

Colour. – Apterous male: Ground colour blackish brown, venter slightly lighter, entire dorsum and la-

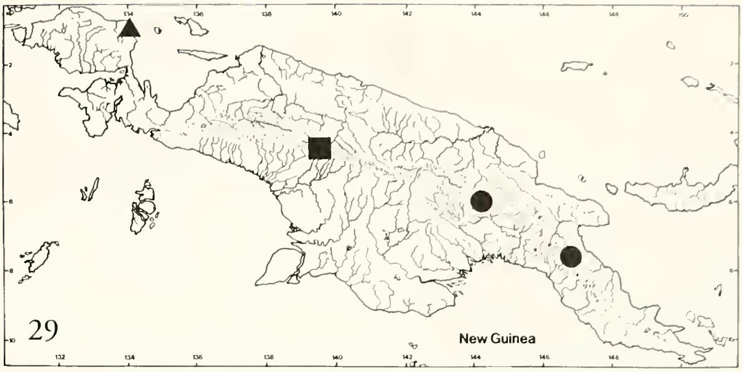

Fig. 29. Distribution of species of *Tarsovelia* gen. n. – Square = *Tarsovelia dani* sp. n.; Circles = *Tarsovelia alta* sp. n.; Triangle = *Tarsovelia arfak* sp. n.

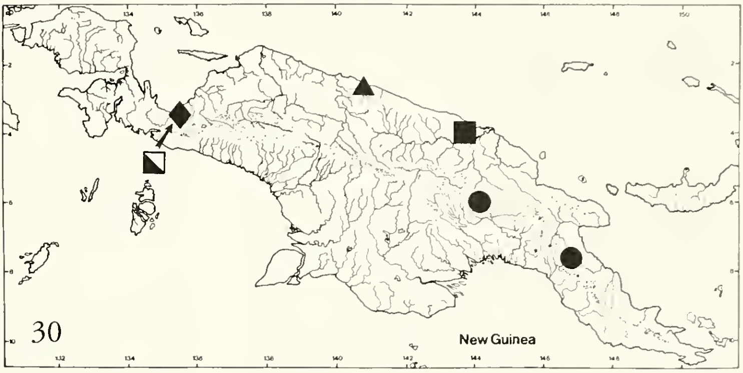

Figure 30. Distribution of species of *Neusterinsifer* gen. n. – Square = *Neusterinsifer sepik* sp. n.; Circles = *Neusterinsifer compactus* sp. n.; Triangle = *Neusterinsifer cyclops* sp. n.; Diamond = *Neusterinsifer nabire* sp. n.; Half filled square = *Neusterinsifer gladius* sp. n.

terotergites covered with fine appressed golden pubescence; entire body except thoracic venter covered with long erect setae. Head black, orange brown beneath; rostrum fuscous medially, piceous distally. Pronotum with anterior transverse orange brown band barely interrupted medially; disc blackish brown. Abdomen blackish brown, lighter ventrally, connexiva margined with orange brown. Antennae brown; anterior legs yellowish, distally darkened; middle, hind legs dark brown to piceous dorsally, ventrally yellowish, femora basally lighter; coxae, trochanters luteous, tinged with fuscous.

Structural characteristics. – Apterous male: head of moderate length, with weak impressed median line; length 0.27; width of eye/interocular space, 0.14/0.30. Pronotum long, covering metanotum, thickly set with obscure foveae, humeri depressed; length:width, 0.37 : 0.95. Metanotum length:width, 0.28 : 0.95. Abdominal tergites not shining; tergites II-VI subequal in length (0.14-0.16), VII longer (0.30).

Abdominal venter set with short appressed setae; venter VI posteriorly set with two (1+1) tufts of dense dark erect setae on either side of midline, with hair free sulcus between; venter VII broadly depressed medially, weakly carinate along posterior margin. Legs, antennae thickly clothed with short to moderate length setae, with scattered longer setae. Middle and hind legs unarmed; fore femur bearing an elongate patch of stiff erect black spinules basally; fore tibia with a swelling distally bearing 5-7 erect short stiff setae (fig. 24).

Antennal formula I : II : III : IV; 0.33 : 0.26 : 0.37 : 0.47.

Proportions of legs as follows: femur, tibia, tarsal 1, tarsal 2 of fore leg, 0.65 : 0.53 : 0.28 : 0.0; of middle leg, 0.84 : 0.79 : 0.16 : 0.28; of hind leg, 0.93 : 1.07 : 0.19 : 0.28.

Proctiger produced anteriorly into a long broad sinuate ensiform process (fig. 20). Parameres vestigial or absent.

Apterous female: Similar to male in most respects, but somewhat larger; connexiva vertical; caudal extreme forming an acute angle.

Macropterous female: Similar to apterous female in many respects, but broader, humeri more pronounced. Hemelytra with light areas in each of the four basal closed cells.

Remarks

Comparative notes. – Recognized by the large, elongate process on the male proctiger that comes to a rounded point (fig. 20), and the elongate patch of black denticles on the inner surface of the male foreleg (fig. 24).

Biological notes. – Yemogu Creek at the type locality was a slow flowing stream running through a rock bed, and containing numerous large pools shaded by slightly disturbed primary rain forest. *N. sepik* was found here in sheltered areas along the margins of the stream pools, and in similar habitats at Brandi River and Mandi Creek, two lowland rainforest streams entering the sea east of Wewak.

Etymology. – The name *sepik*, a noun in apposition, refers to the district of Papua New Guinea from which the type series was taken.

Distribution. – Northern New Guinea (fig. 30).

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Holotypes of all new species described herein are deposited in the Bishop Museum, Honolulu (BPBM), or the U.S. National Museum of Natural History, Washington, D. C. (-USNM); paratypes are held in the J. T. Polhemus collection, Englewood, Colorado (JTPC), and where numbers permit will be distributed to the institutions noted above as well as the Museum Zoologicum Bogoriense, Bogor, Indonesia (MZB), and the Universitets Zoologisk Museum, Copenhagen (ZMUC). We also thank Dr. Martin Baehr of the Zoogische Sammlung des Bayersichen Staates, Munich (ZBSM) for allowing us to examine specimens held under his care.

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